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THE FINANCING OF MUNICIPAL SERVICES--

A CASE STUDY

by

BERND EBEL

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled THE FINANCING OF MUNICIPAL SERVICES -- A CASE STUDY

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ABSTRACT

Motivated by the tight fiscal situation of municipal governments today, this study analyzes the two alternative methods of financing the muncipal service of refuse collection--general revenue and service charge financing--in an attempt to derive a clear picture of the economic implications of both methods and their relative merits.

Historically general revenue financing of the residential collection service prevailed in the City of Edmonton and still does so at the present time. Many other municipalities have imposed a charge for this service, thereby utilizing an additional source of revenue and easing the pressure on the general revenue fund.

It was found in this investigation that, given the present set of economic and political circumstances, charging the user the entire cost of the service would be desirable from the revenue aspect and also feasible from the administrative point of view. The negative characteristics connected with this mode of financing appear to be outweighed by its advantages.

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CHAPTER I

INTRODUCTION

Purpose of the Study

Modern city governments are expected to provide a wide and growing spectrum of services, ranging from necessities, such as sewage and refuse collection and disposal, to those services, or amenities, that are concomitant with a high standard of living, for example, libraries and swimming pools.

The widening gap between the costs of these services and the available revenues constitutes one of the main economic problems of the cities. The solution lies in the successful closure of this financial gap.

There are, in general, two kinds of solutions: firstly, those which involve senior levels of government (provincial or federal) and, secondly, those which are inside the realm of the municipal government.[1] In the latter group two major possibilities exist: an increase in the property tax or the employment of alternative sources of revenue. The application of service charges to the collection, removal, and disposal of refuse would be one such alternative source for the City of Edmonton. An economic analysis of the various aspects of this possibility is the subject of this study.

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[1] See Appendix I for a list of actual and potential revenue sources for municipal governments.

The Fiscal Gap in Municipal Finance

The growing disparity between total municipal revenues and total municipal expenditures is being referred to as the fiscal gap in municipal finance. This phenomenon, arising over the past decades, has frequently been called an 'urban crisis' in order to accentuate the severity of the situation.[1]

After briefly touching upon the causes of the present fiscal dilemma of municipal governments, an attempt will be made to provide some information on the quantitative magnitude of the problem.

Foregoing an extensive analysis of their development one may nevertheless list three important factors that appear to lie at the root of the fiscal problem of the cities.

Firstly, the shift in population from rural to urban areas has led to a rapid growth of the cities.

> Over the forty [sic] years, 1911 - 41, there has been a radical shifting in the distribution of the Canadian population from rural to urban districts. The change has been continuous throughout the period.[2]

During the following twenty-five years this trend persisted and the share of the urban population in the total population of Canada increased from 56.5 per cent in 1941 to 73.6 per cent in 1966. The corresponding figures for the Province of Alberta are 33.4 and 68.9 per cent respectively.[3] During the same period the

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[1] Cities of Alberta, The Alberta Urban Municipalities Association, and the Public and Separate School Boards in Each City, Urban Crisis, (January, 1968) p. 4.

[2] Canada, Dominion Bureau of Statistics, Canada Year Book, 1951, (Ottawa: Queen's Printer, 1968) p. 122.

[3] See Appendix II, Tables 1 and 2.

population of the City of Edmonton increased from 93,929 to 381,230.[1] These population movements greatly increased not only the size but also the complexity of cities and had immediate implications on the provision of municipal services.

Secondly, the constant change of man's conscience--spurred on, maybe, by the accelerated pace of development in arts, science, and technology in the past one or two centuries--has reached a point where it has definite impacts on the structure of society. The evolution of the 'nuclear family', apparently a necessary condition for industrialization, resulted in a decrease of individual responsibility towards the members of the extended family. By the basic nature of man, this decrease had to be compensated by an increased sense of social responsibility which is manifested, for example, in health and welfare services for the aged and disabled. These functions were delegated to the local governments by the provinces mainly for administrative reasons. This is also true for education; the significant indirect social benefits yielded by this particular service may explain part of its enormous expansion.

The social changes outlined above are most pronounced in the cities, the centers of man's progress. The cities also have become the centers of economic activity and the higher incomes are drawn from here. Consequently urban dwellers generally enjoy a higher standard of living than people in rural areas (a reason, in turn, for the aforementioned population movements). It is a paradoxical aspect of the fiscal position of cities that, although incomes per capita are higher in urban than in rural areas, the municipal governments are the poorest of all. The main reason for this dilemma may lie in the fact that federal and provincial governments

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[1] See Appendix II, Table 3.

tax incomes heavily, leaving the municipalities to tap other sources--mainly the regressive property tax. Another critical factor may be that a large proportion of the services provided by the city are activities falling in sectors of the economy that offer only very limited scope for increases in productivity because of the special role of labor inputs.[1] Education, health and welfare services, and fire and police protection may serve as examples.

The increasing standard of living is reflected in the desire of the public for higher standards of performance in the provision of services and this greatly enhances their costs. It is these demands for an urban life of high quality which will make heavier the financial burden on local governments in the future. It seems that spill-over effects and spiralling costs of many local services have rendered the present divisions of functions among the levels of government inappropriate.

Thirdly, while important social and economic changes have taken place, the distribution of revenue sources among the three levels of government has remained essentially the same as in 1867 as far as municipal governments are concerned.[2] Due to the income-inelastic nature of their revenue sources this distribution put municipal governments into severe financial straits. Graph 1 depicts the financial situation of Canadian municipal governments.

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[1]William J. Baumol, "Macroeconomics of Unbalanced Growth," American Economic Review (June, 1967), p. 423.

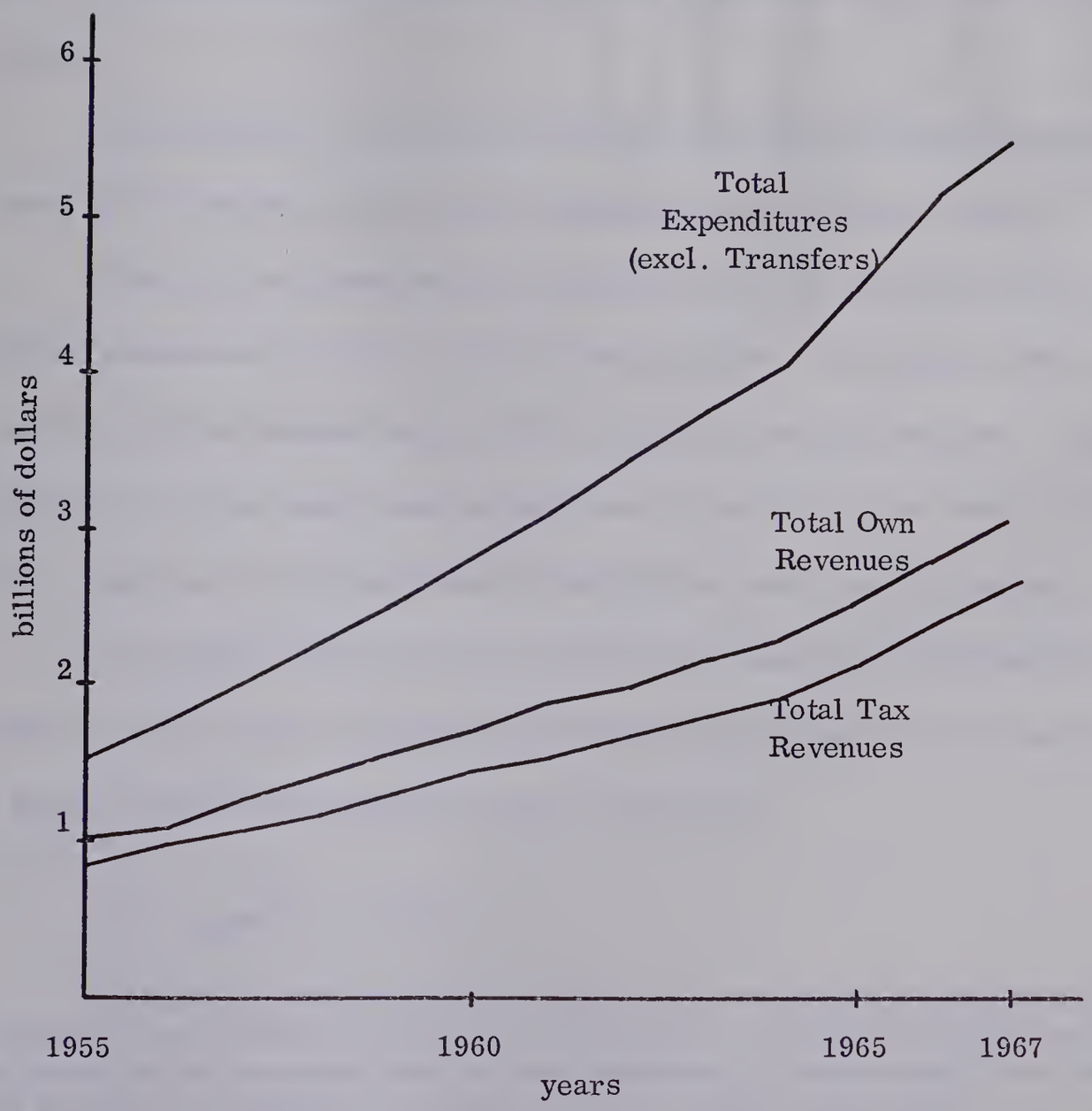
[2]Canada, A Consolidation of the British North America Acts, 1867 to 1965, consolidated as of January 1, 1967, (Ottawa: Queen's Printer, 1967), Sect. 91, p. 24; Sect. 2, p. 27; Sect. 109, p. 33; the last section is of special significance to the Province of Alberta because of oil, gas, and other royalties. The City of Edmonton benefited indirectly through increasing payments under the Municipal Assistance Act.

GRAPH 1

Revenues and Expenditures of

Municipal Governments in Canada,

1955 - 1967



Source: Appendix II, Table 4.

While revenues and expenditures (excluding transfers) of Canadian municipal governments totalled $455 million and $587 million respectively in 1947, a deficit of $132 million, the deficit had grown to $2,530 million in 1967, with revenues and expenditures (excluding transfers) of $3,086 million and $5,616 million respectively.[1] In relative terms, the excess of expenditures over revenues amounted to 22.5 per cent of total expenditures in 1947 and was as high as 45.0 per cent in 1967. This trend clearly reflects the growing indebtedness of Canadian municipalities.

By comparison, the financial position of the City of Edmonton was significantly better than that of the average Canadian municipality (see Graph 2).[2]

The city's own revenues and expenditures were $6.4 million and $7.2 million respectively in 1947, a deficit of $0.8 million, and as high as $68.2 million and $96.2 million respectively in 1967, with a deficit of $28.0 million.[3] The deficit rose from 11.4 per cent of total expenditures in 1947 to 47.0 per cent in 1954, fell to 17.3 per cent in 1962 and climbed steadily from then on to 29.1 per cent in 1967.

It is in the presence of these trends that it appears to be advisable for municipalities to review their services in an attempt to tap potential revenue sources. To a certain extent this attempt has already been made.[4]

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[1] See Appendix II, Table 4.

[2] It must be noted that the time series of revenues and expenditures for Canadian Municipal Governments and The City of Edmonton, on which the graphs are based, were not computed on the same basis and are therefore only approximately comparable. See the footnotes to Appendix II, Tables 4 and 5 for further information.

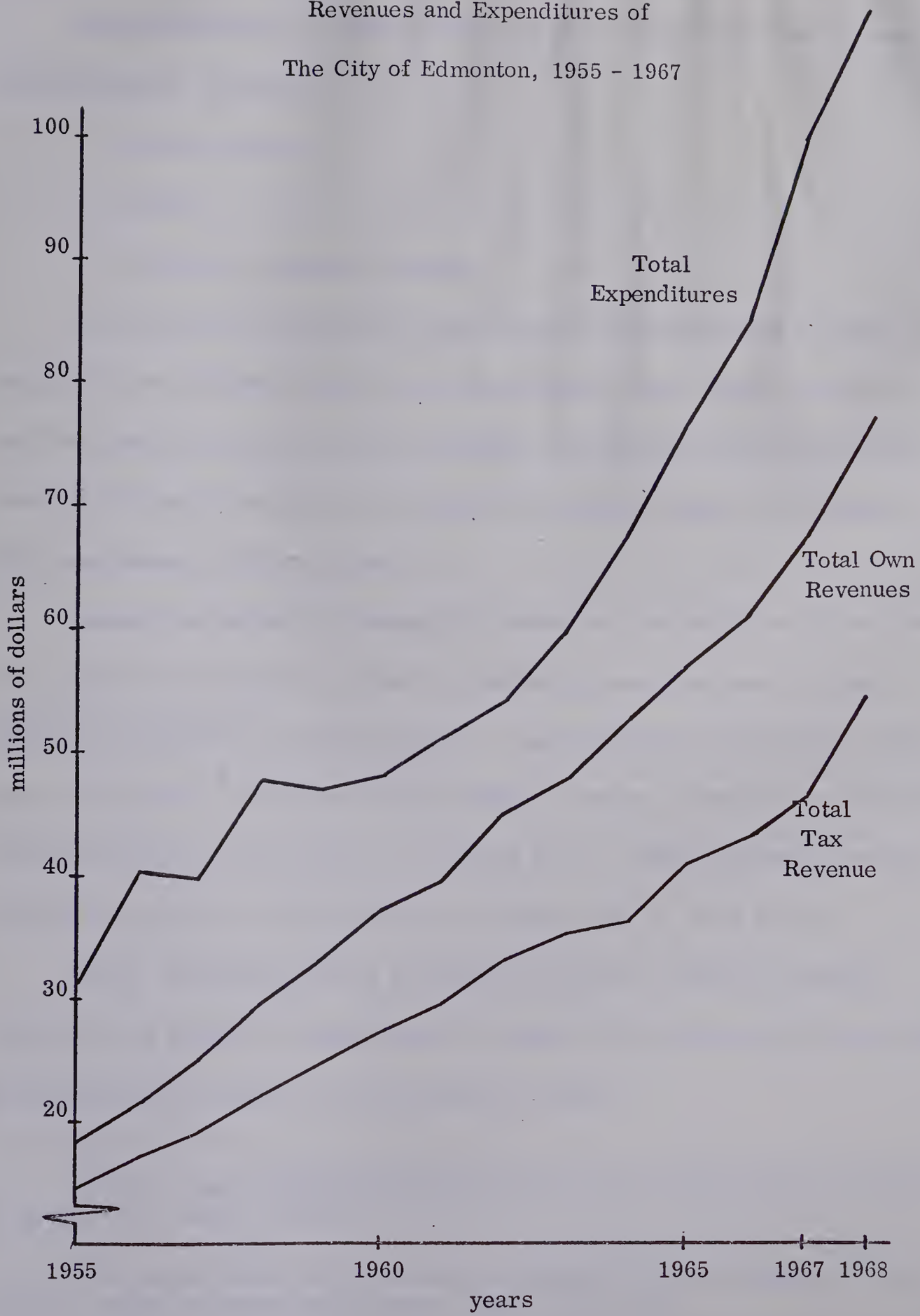
[3] Source: Appendix II, Table 5.

[4] James A. Maxwell, Financing State and Local Governments (Washington, D.C.: The Brookings Institution, 1965), pp. 175-177.

GRAPH 2

Revenues and Expenditures of

The City of Edmonton, 1955 - 1967



Source: Appendix II, Table 5.

Definitions

The ambivalence of common usage requires a careful definition of some technical terms. These are:

1. service charge
2. refuse
3. collection, removal, disposal

First, the price imposed by a government on the provision of a service or the right to use a facility is known as service charge or user charge, when the individual benefited can be correctly identified and billed according to the benefit received. External economies in the form of community benefits are usually of little importance in these activities.[1]

Second, the gathering of comparable statistical information would be eased and a great deal of confusion avoided if municipal governments were to adopt a standard classification of waste materials. The classification adopted here would serve this purpose.[2] The term waste includes all useless, unwanted, or discarded materials whether in solid, liquid, or gaseous form. Table 6 (Appendix) provides detailed information on the classification of refuse, that is, solid wastes.

Third, in terms of activity analysis the process of ridding households, commercial or industrial establishments of refuse falls into three distinct processes: the collection, the removal, and the disposal of refuse.

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[1]John F. Due, Government Finance (3rd ed.; Homewood, Illinois: Richard D. Irwin, Inc., 1963), p. 390.

[2]American Public Works Association, Refuse Collection Practice (3rd ed.; Chicago: Public Administration Service, 1966), pp. 13-22.

Collection involves the carrying of refuse containers from, usually, alley, curb, or yard to the collection vehicle by members of the collection crew. The predominant cost items here are the number of man-hours and truck-hours and these are influenced by, among other factors, the distance between truck and refuse containers and whether the driver of the vehicle takes part in the collection. The process of removal involves the hauling of refuse to the point of final disposal. In this case the above-mentioned cost items are mainly affected by the length of the haul. Henceforth, the term collection will be understood to include this activity. The major methods of final disposal are a sanitary land-fill operation or incineration and subsequent disposal of the residue. The former method is generally the cheapest, and the latter method, because of high capital and operating costs of incinerators, the most expensive one.[1]

Limitations of the Study

This study will neither attempt to evaluate the engineering nor the economic efficiency of the present system of refuse collection and disposal in the City of Edmonton. The focus is on the question whether, in principle and for revenue purposes, the introduction of a charge for this particular service would be desirable. It is generally implied that a service charge would be imposed to finance both collection and disposal.[2]

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[1]However, as incineration reduces the volume of refuse by about 70 per cent and its weight by about 85 per cent, depending on the type of refuse, incineration may well be the most economical method of disposal if suitable land-fill sites are not available. See American Public Works Association, Municipal Refuse Disposal, (2nd ed., Chicago: Public Administration Service, 1966), p. 177.

[2]Lennox L. Moak, Refuse Collection and Disposal Service Charges, (Chicago: Municipal Finance Officers Association of the United States and Canada, 1962), p. 3.

Although the emphasis throughout the study will be laid on the economic and financial features of this service, some remarks will have to be made on the physical characteristics of the system of refuse collection and disposal in order to provide some background information.

It is in no way contended that the increased use of service charges may constitute a patent solution to municipal financial problems. Rather, this work is meant to be understood as an attempt to tackle a narrow subject using an economic approach.

Finally, it should be noted that questions of political feasibility or convenience are considered to be outside the scope of this study. It is felt, however, that the approach and the underlying ideas are neither radical nor Utopian; they will be shown to have worked well elsewhere.

CHAPTER II

COMPARATIVE SURVEY

To the observer of the scene both the physical and the financial parts of refuse collection appear to be in a state of flux. The reason for this may be found in the increasing amounts of refuse generated in rapidly growing cities. The rise in the total amount of refuse produced is not due to the population increase only, but also stems from increasing per capita amounts. Figures given by the United States Department of Health, Education and Welfare show that the per capita refuse production in that country was about 2.7 lb/cap/day in 1920, about 4.1 lb/cap/day in 1960, and is expected to reach 6.0 lb/cap/day in the middle 1980's.[1] These tendencies and the desire of the general public for an improved service necessitated—and continue to do so—the development of new and improved equipment and methods of collection and disposal.

Associated with the growth in the physical volume of refuse collection has been an increase in its costs. Although this fact alone would warrant the increased attention paid to the financing of refuse collection, it does so even more in connection with the deteriorating fiscal position of the cities.

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[1] United States Department of Health, Education and Welfare, Public Health Service, Division of Environmental Engineering and Food Production, Solid Waste Handling in Metropolitan Areas, from American Public Works Association, Refuse Collection Practice, pp. 25-26.

Refuse Collection in Canadian Municipalities

There is a wide variation across the country in the extent to which municipal governments are engaged in the collection of refuse. A recent survey indicates that among the 36 Canadian municipal governments taking part there were four reporting no direct responsibility for refuse collection while ten provided a collection service for all types of refuse.[1]

As one might expect, the methods of financing the collection service vary widely, ranging from service charge financing which is one hundred per cent self-supporting to entirely general revenue financing.

The participating municipal governments were arranged in five groups:

Group I - service charge imposed for each category of refuse collection service rendered

Group II - partial list of service charges imposed for refuse collection service rendered

Group III - no service charges for refuse collection services rendered

Group IV - refuse collections performed by private collector operating on a franchise

Group V - no direct responsibility for refuse collection

Of the four cities in Group I, only in Kamloops and in Quebec City was the collection service one hundred per cent self-supporting.[2] All municipal governments falling into Group II covered most of their refuse collection costs out of

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[1]Moak, Refuse Service Charges, Appendix Tables A-2 to A-6, pp. 18-36. This chapter is based mainly on Moak's data.

[2]See Appendix II, Table 7.

general revenues. In this group are, among others, the cities of Edmonton, Calgary, Winnipeg and Victoria.[1] None of the municipal governments in the first two groups made use of private contractors for the purpose of refuse collection. It must be drawn to attention, however, that refuse-generating parties may well contract a private operator in favour of the municipal service. For this reason the amounts of refuse collected by the public agency in cities of similar size may differ considerably.

Fifty per cent of the Canadian municipal governments responding to the survey can be found in Group III, that is, they finance their collection service out of the general revenue fund.[2] Some cities in this group provide a comprehensive collection service, for example, Regina and Windsor, while others, such as Fredericton do little else but collect household garbage. One-third of the municipalities in this group make use of private contractors. There were no Canadian municipal governments in Group IV and of the five municipalities in Group V three did not assume any responsibility, direct or indirect, one had a private service, and in one, Toronto (Metro), the constituent municipalities were responsible for the collection of domestic and commercial garbage and rubbish.[3]

In sum, 13 of the 31 Canadian municipal governments reporting in the survey and performing one or more kinds of refuse collection services employed service charges to a greater or lesser extent as a means of financing the service in 1961.

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[1] See Appendix II, Table 8.

[2] See Appendix II, Table 9.

[3] See Appendix II, Table 10.

Refuse Collection in the United States

This section will review refuse collection services in the United States and compare the use of service charges in the United States to that in Canada.[1]

The amount of collection services rendered by those local governments in Groups I - III appears to be about the same in the United States as in Canada. Similarly, the percentage of local governments providing no collection services is about the same in both countries, namely, 13.9 per cent in Canada and 14.4 per cent in the United States. In the United States, there were, however, 24 out of 344 local governments (7 per cent) in Group IV, that is, they made franchise arrangements for the collection of refuse.

As to the mode of financing it is of interest that in the United States 24.7 per cent of the local governments made full service charges compared to only 11.1 per cent in Canada. While the percentage of local governments using general revenue financing exclusively is about the same in both countries (50.0 versus 47.1 per cent for Canada and United States respectively), a sizeable difference exists in the group of mixed financing (Group II). In Canada 25.0 per cent of the municipal governments made partial use of service charges in order to finance refuse collection, whereas only 8.4 per cent did so in the United States.[2]

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[1] Any comparative statement must of course assume that Moak's samples of Canadian and U. S. municipal governments are representative. This assumption appears to be reasonable; see Moak, Refuse Service Charges, p. 1.

[2] Moak, Refuse Service Charges, Table 2, p. 2. Absolute figures only.

It is worth noting that the public responsibility for the direct discharge of collection functions paid from general revenue decreases as one moves through the classes of collection services.

> Thus, in the collection of domestic rubbish slightly less than half the 380 local governments provide for this solely from general revenue. In the collection of commercial garbage the percentage drops to about 40 per cent; in the collection of commercial rubbish to about 25 per cent; and in the collection of industrial wastes to less than 10 per cent.[1]

It is also apparent from the survey that once a local government decides to impose a service charge for refuse collection, it is more likely to extend its services to commercial and industrial establishments than when the collection services are financed exclusively from the general revenue fund.

Contemporary Trends

It is the purpose of this section to point out developments in the financing of refuse collection; a discussion of the equipment used and the methods of refuse collection will be deferred to the next chapter.

An analysis of recent surveys reveals that there is a significant trend towards a wider use of the service charge method of financing. Judging on the basis of those local governments which imposed a service charge for each type of refuse collection performed, it appears that this trend originated in the early 1940's. While only seven local governments in Canada and the United States adopted service charge financing in the decade 1930 - 1939, thirty-five did so between 1940 and 1949, twenty-seven between 1950 and 1959, and as many as

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[1] Moak, Refuse Service Charges, p. 3.

four in the year 1960 alone.[1]

The trend toward service charge financing, wholly or in part, is also borne out by a 1964 survey in which 857 Canadian and United States local governments participated.[2] Although there were some discrepancies, between a 1955 survey of 849 cities and the 1964 survey, a definite trend towards greater reliance on service charges for refuse collection is discernible, especially in the group of cities which use mixed financing, that is, general revenues and service charges.

The reason for the increasing use of service charges in refuse collection and, for that matter, in other municipal services, may be found in the relative scarcity of funds at the local level of government, relative, that is, to the amount of public wants. For it is the provision for the satisfaction of these wants which requires governments to make expenditures for goods and services. It should be noted that the independent variable often appears to be the magnitude of public wants rather than the available revenues of the municipal governments.

Given this situation, service charges in general have attributes which make them an attractive source of additional revenues. They can be a potent alternative to the property tax and, being based on the benefit principle, appeal to the sense of fairness of the public. They are, moreover, subject to complete control of the levying government; they are flexible and can be readily adapted to changes in the costs of providing the service.

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[1] See Appendix II, Table 11.

[2] American Public Works Association, Refuse Collection Practice, p. 271.

It is felt that "... the importance of these charges is likely to increase, although their rate of growth may decline."[1] The amount of the decline may depend greatly on whether or not a more basic solution to the financial problems of municipal governments can be found.

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[1]Gerald J. Boyle, Use of Service Charges in Local Government, Studies in Business Economics, No. 68 (New York: National Industrial Conference Board, Inc. 1960), p. 13.

CHAPTER III

THE SYSTEM OF REFUSE COLLECTION IN THE CITY OF EDMONTON

After evincing the need of municipal governments for additional revenue sources by showing the financial situation of Canadian municipalities in general and of the City of Edmonton in particular, and after providing some information on the diverse methods of financing refuse collection services in North America, the focus will now be on the physical and financial characteristics of refuse collection in the City of Edmonton.

Public Utilities versus Departmental Services

The decisive criterion of whether some goods and services are provided by public utility companies or by government departments appears to be the feasibility of financing the service. Public utility companies, on one hand, can operate in a manner similar to that of a private enterprise, given the framework set by the municipal government. They can sell their services at a price which will, in principle, cover the total costs of providing the service including a reasonable return on the invested capital. Government departments, on the other hand, generally provide services for which it is impossible or impractical to charge a price. The reason may be that either the users or beneficiaries of the service cannot be correctly identified and billed or because the administrative costs are prohibitive and would reduce the net revenue to a negligible or even negative amount.

In these cases the service is best financed out of the general revenue fund.

The City of Edmonton rates well above the North American average in the number of public utility companies it owns and operates.[1] The utilities are Edmonton Power, Edmonton Generation and Water Treatment, Edmonton Transit System, Edmonton Telephones, Edmonton Water Department, and Edmonton Industrial Airport.[2] One major utility service, the supply of natural gas, is provided by a private company under a franchise arrangement with the City of Edmonton.[3] The collection and disposal of liquid and solid wastes are still performed departmentally in Edmonton and primarily financed from general revenues.[4] But in either case the individual consumer can be correctly identified and the amount of service used can be determined quite accurately, either directly (number of refuse containers per household) or indirectly (quantity of water consumed). The possibilities of identifying the beneficiary of the service and of measuring the amounts of service consumed are vital prerequisites for a businesslike, self-supporting operation of the unit producing the service. They

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[1]Kidder, Peabody and Co. Incorporated, The City of Edmonton (A Report for the Issue of Sinking Fund Debentures, January 1968), p. 21.

[2]The City of Edmonton, Financial Statements and Reports, 1967, p. 40-41.

[3]Natural gas is supplied in the City of Edmonton by Northwestern Utilities Ltd.

[4]Refuse collection service charges will be dealt with in detail below. A sewer service charge is levied in Edmonton which is indirectly, via water consumption, tied to the quantity of sewage generated. In addition a sewer frontage tax is levied. Both these charges stand, however, in no relation to the total costs of providing for sewerage.

appear to be met in the cases of refuse and sewage collection and disposal.[1]

Some remarks about the benefit situation in the case of refuse collection may be in order here. The service of refuse collection and disposal takes a somewhat unusual place in that it has both significant public and private benefits attached to it which are really inseparable. The public aspect is connected to the psychological benefit derived from a clean city and to public health. An allusion to the strike of refuse collectors in New York City in 1968 may suffice to illustrate this point. The private aspect, a more primary one, relates to the wish and the responsibility of the individual consumer to have certain goods (or 'bads') removed and disposed of after the potential use has been extracted from them. The realization that the riddance of goods yields benefits in a way similar to their acquisition is basic to this point. The recognition of this primary character of refuse collection justifies and can be expressed in a service charge.

Historical Development

In 1907, three years after the incorporation of Edmonton as a city, the revenues from refuse collection amounted to $296 with expenditures of $35,932.[2] The collection work was carried out by private contractors, the City letting the contracts by tender. In 1909 city officials, dissatisfied with the private service,

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[1] See bibliography for references on sewer service charges.

[2] City of Edmonton, Financial Statements and Auditor's Report, 1907. The financial data on refuse collection before 1907, and especially before 1904, appear to be incomparable to those after 1907. For example, the expenditures for refuse collection (scavenging) were $8.10 in 1901 (Town of Edmonton, Financial Statements, 1901). It is conceivable that this was the amount spent on the collection of refuse generated by the town administration.

suggested to the City Council that the collection service be taken over and performed by the City:

> Moreover, the question as to whether the time has not come when the scavenging of the City should be taken over and managed as a civic enterprise under the direct control of the Health Department, should receive your careful consideration before the contract is again let to private contractors.[1]

The City followed this proposal in 1910 with very satisfactory results.[2] Due to rapid development of the City the number of horse and wagon teams increased from eight in 1911 to thirteen in 1912 on the North Side, and from three to four during 1912 on the South Side.[3] Refuse collection by way of horse and wagon ended in Edmonton in 1953-54. In 1952 there were still five horse-drawn wagons in operation, each carrying about two cubic yards; in addition gravel trucks with extended sideboards were used for refuse collection, each carrying about eight cubic yards.[4] Due to bad roads horses and wagons had remained economical until the early 1950's, but they were then replaced by tractors and trailers because of muddy roads and relatively sparse settlements in many areas of the City.[5] A truck crew consisted

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[1]Municipality of the City of Edmonton, Financial and Departmental Reports, 1909, p. 130.

[2]Ibid., 1910, p. 140.

[3]City of Edmonton, Eighth Annual Financial and Departmental Report, 1912, p. 137.

[4]Information obtained in an interview with R. C. Dilke, Sewage Treatment and Wastes Engineer, Engineering Department, City of Edmonton.

[5]This fact had already accounted for relatively high collection costs in Edmonton in comparison to Winnipeg in 1913. City of Edmonton, Ninth Annual Financial and Departmental Report, 1913, p. 359.

of three loaders and one lead man. There were two trucks assigned to each crew and a shuttle system was envisaged, but the system did not work out as the men could not load continuously strengthwise, with a minimum loading height of six feet. In 1954 a newly designed collection vehicle was adopted by the City.

The primary method of refuse disposal in Edmonton has been dumping. Early dumps were located at various points throughout the City, for example, at Grierson Hill and Groat Ravine. In 1954 closure of the Calder and East End yard sites was imminent. The Beverly dump site was purchased in 1956 and its closure is imminent now. The South Side dump between 40th and 45th Avenues east of 75th Street is a sanitary land fill operation and used by the City and private collectors.

The first incinerator plant in Edmonton started operating in 1908. A new incinerator was built in 1935, located at the site of the present incinerator which was constructed in 1953-54. The present incinerator will be demolished in the near future to make room for road construction. Then all refuse generated in the City will be disposed of in sanitary land fills.

Physical Characteristics of the Present System

The trucks used presently by the City of Edmonton for refuse collection are of the side loader, enclosed noncompactor type. They were designed locally in 1954 and represent a considerable improvement over the previous type of collection vehicle in two respects. Firstly, the loading height was reduced by two feet to four feet. "The loading height of refuse collection vehicles is one of the most critical features of their design. As a general principle, the lower the loading

height the more rapidly and easily the material can be loaded."[1] A reduction in the loading height is therefore tantamount to a reduction in the collection costs. Secondly, the employment of sliding covers improved the appearance of the trucks and eliminated litter problems, while, at the same time, permitting the crew to load along the full length of the truck on both sides. The collection crew consists of two men per truck, and the driver takes part in the loading.

During the year of 1968 an average of sixty-seven trucks were used daily.[2] On the average forty-six were in operation on the day shift and twenty-one on the night shift. The truck requirements varied between fifty-seven per day during the winter and seventy-five per day in the summer. At the present time the fleet of collection vehicles consists of seventy-six trucks. All of these are rented from the Engineering Department at a rate of $5.51 per hour of operating time. This rate includes the wage of the driver.

The geographical growth of the city and the rapid population increase resulted in an increase in the number of collection routes. Given the equipment this necessitated more routes being placed permanently on night collection. At the end of 1968 the city was divided into sixty-two collection routes of which seventeen were permanently and three to five temporarily on night collection.[3]

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[1] American Public Works Association, Refuse Collection Practice, p. 136.

[2] The City of Edmonton, Engineering Department, Sanitation Section, Annual Report, 1968, p. 7.

[3] Ibid., p. 2. Temporary night collections are carried out during periods of excessive refuse and in weeks which include a holiday. In 1968 temporary night collections were due mainly to a shortage of vehicles.

The total amount of refuse hauled amounted to 128,854 tons in 1968, an increase of 12.6 per cent over the previous year.[1] The expectation of ever increasing amounts of refuse generated in the city, the necessity for the phasing out of the Beverly dump and the impending demolition of the incinerator led the City to acquire a new potential dump site outside the city limits. The increase in hauling distance will tend to change the physical system of refuse collection as well as increase its costs.

Alternative Systems of Refuse Collection

The main alternative to the trucks currently used in Edmonton are the enclosed compactor trucks. There are many different types manufactured and in use but they all have in common special mechanical devices for loading the refuse into the main compartment of the body, for compressing the loaded material, and for distributing it within the body, thus allowing relatively large quantities of refuse to be loaded before returning to the disposal site. Another significant advantage over the noncompactor truck is the extremely low loading height of about two feet, achieved through the installation of receiving hoppers. These are usually big enough to allow three collectors to dump containers simultaneously so that no delay occurs.[2] The low loading height eliminates much of the physical strain on the collectors thereby improving their working conditions considerably. The main disadvantages are higher purchase, maintenance and operating costs.

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[1] See Appendix II, Table 13.

[2] American Public Works Association, Refuse Collection Practice, pp. 148-149.

As far as the City of Edmonton is concerned, the main factors working against the adoption of compactor trucks were their high purchase and maintenance costs and the relatively low hauling distances involved in Edmonton. It can be expected that the dumping of refuse at the newly acquired site, located some 10 miles from the city, will have pronounced effects on the types of equipment used for hauling. One economically feasible system would involve the construction of, say, four transfer stations at strategic locations in the city. The collection trucks presently used would take the refuse to one of these stations where it would be loaded into large hauling trucks capable of carrying a multiple of the volume of the collection vehicles. An analysis, based primarily on cost-distance curves for different vehicles, revealed that the transfer system would be the most economical one for the City of Edmonton.[1]

Private Collectors in Edmonton

The City of Edmonton does not assume any responsibility for the collection and disposal of trade refuse, that is, garbage and rubbish generated by commercial or industrial establishments. The City will, however, remove such refuse if contracted, the City Engineer being the "sole judge of the quantities of refuse that are involved in the contract."[2] In this area the City is competing with eight private

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[1]Information obtained in an interview with R. C. Dilke, Engineering Department, City of Edmonton.

[2]The City of Edmonton, A Bylaw of the City of Edmonton Regulating the Collection of Waste, Bylaw No. 1895 (Edmonton, 1958), Sect. 17 (3), p. 11.

collectors.[1] Casual observation shows that these collectors are using modern hydraulic equipment, containers of various size and that they provide a very individualized service to their customers.

The quantity of refuse collected by private companies amounted to an estimated 232,103 tons compared to only 128,854 tons hauled by the City.[2] The refuse moved by private collectors to the City disposal sites was dumped there free of charge. Whether or not this amounts to a subsidization of private businesses out of the general revenue fund cannot be said with certainty; it would be the case, if the mill rate necessary to cover dump operating costs, when applied to the property taxes paid by businesses which generate relatively large quantities of refuse, would not be sufficient to cover the costs of disposing of these amounts of trade refuse.[3] A more detailed quantitative analysis of this point

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[1]The following private collectors were operating in Edmonton at the end of 1968: Alpine Disposal, Capital City Disposal Services Ltd., Casavant Waste Removal Co., Dawson Disposal Co. Ltd., Dominion Disposal Services Ltd., Double L Disposal, Reed's Disposal and Home Clean up, and North West Disposal. In addition there was Burton Loaders Ltd., operating mainly in St. Albert.

[2]Calculated from the City of Edmonton, Engineering Department, Sanitation Section, Annual Report, 1968. Amounts of refuse taken to the disposal site by individuals are ignored because of insignificance.

[3]This is actually the case. The dump operating costs of $117,381 in 1968 amounted to 0.16 mills on the net taxable assessment of the property tax. This mill rate applied to residential property yields $77,724 and yields $39,616 when applied to non-residential property (calculated from the City of Edmonton, Distribution of 1968 Property Assessment Roll). So, while the amount of trade refuse dumped is about double that of residential refuse, only about half the amount of money is coming forth for this purpose from non-residential property as is from residential property. Since trade refuse is not collected free of charge, it may be argued, however, that the total mill rate necessary to finance collection and disposal (2.21 mills) should be applied to non-residential property and the amount received then would be the criterion for deciding who is subsidizing whom. In this case the yield is $544,468 which is far higher than the total dump operating costs.

would go beyond the scope of this study but it is felt that— independent of the result of such study—a service charge method of financing the disposal sites would be clearer, more equitable, and relatively easy to administer.

Present Method of Financing Refuse Collection

The conditions and practices with regard to refuse collection are laid out in 'A Bylaw of the City of Edmonton Regulating the Collection of Waste'.[1] It states that

> "Ashes, garbage and refuse from dwellings as herein defined [single family and duplex houses] shall be removed by the City forces or forces provided by the City, free of charge, when the total quantity does not exceed one cubic yard per week. In the event of any such collection exceeding one cubic yard the excess shall be charged for at a rate per cubic yard sufficient to cover the cost to the City of performing such service, ..."[2]

and further that

> "Ashes, garbage and refuse from any apartment house...shall be removed by City forces or forces provided by the City free of charge where the total quantity does not exceed one fifth of a cubic yard per week from each separate living unit therein."[3]

The provisions for excess refuse are the same for apartment houses as for single family or duplex dwellings.

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[1] The City of Edmonton, A Bylaw of the City of Edmonton Regulating the Collection of Waste, Bylaw No. 1895 (Edmonton, March 1958).

[2] Ibid., Sect. 17 (1), p. 10. One cubic yard is approximately equal to five large cans of refuse.

[3] Ibid., Sect. 17 (2), p. 10.

Buildings owned by the Crown and exempt from taxation are not provided with collection services, but the authorities in charge of such buildings may contract the City's service at conditions similar to those applying to commercial and industrial establishments and to the collection of excess residential refuse - service at a price which will cover the City's collection costs.[1] The service is provided free of charge to churches and charitable organizations which are exempt from taxation.

The total costs of refuse collection and disposal in the City of Edmonton amounted to $1,690,672 in 1968.[2] The major portion of this total was needed for the collection of 128,854 tons of refuse; truck rentals and labor costs required an expenditure of $1,374,282 on this item, an equivalent of $10.67 per ton. The burning of 64,755 tons of refuse cost $199,009 in operating and maintenance costs of the incinerator, or $3.07 per ton, and the dumping of 306,202 tons cost $117,381, or $0.38 per ton. No capital costs were incurred since, firstly, both incinerator and dumps have been depreciated completely and, secondly, the collection vehicles are rented from the City's Engineering Department, as mentioned above.[3] Overhead costs are included in the above cost figures.

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[1]The City of Edmonton, A Bylaw of the City of Edmonton Regulating the Collection of Waste, Bylaw No. 1895 (Edmonton, March 1958), Sect. 17 (4), p. 11.

[2]The City of Edmonton, Engineering Department, Sanitation Section, Annual Report, 1968. The costs are expected to increase to $1,920,000 in 1969. The City of Edmonton, Finance Department, Current Estimates, 1969.

[3]There may be capital costs in the future, namely the purchase costs of the new dump site and the construction costs of transfer stations.

The operational revenues amounted to a mere $76,706, consisting of $71,023 from collection service charges and $5,683 from incineration and salvage. This leaves a balance of $1,613,966 to be financed out of the general revenue fund, an equivalent of 2.21 mills on the net taxable assessment of the property tax. With service charges covering less than one-twentieth of the total expenditure the method of financing refuse collection and disposal is essentially one of general revenue financing. It would appear to be appropriate, therefore, to investigate the advantages and disadvantages of this method.

Critical Evaluation of General Revenue Financing

In analyzing the relative merits of general revenue financing it is convenient to distinguish between the advantages and disadvantages that are inherent in the method as such and those which arise from the specific conditions of refuse collection financing in the City of Edmonton.[1]

One advantage of general revenue financing is that it is logically consistent with the public health aspect of refuse collection. A complete refuse collection service benefits the entire community, it is argued, and should therefore be financed out of the general revenue fund. This argument is, however, not very cogent because of the dual nature of benefits arising from this service. The presence of strong individual benefits can hardly be denied; these would tend to justify service charge financing.

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[1]The analysis of the general aspects is based on American Public Works Association, Refuse Collection Practice, pp. 271-272.

Another argument relates to equity considerations in the financing of municipal services by stating that general revenue financing distributes the costs of this service more nearly on an ability-to-pay basis than any other commonly used mode of financing. Before elaborating on this point a basic remark on the problem of equity may be in order. It is felt that under the existing tax structure and in face of the present financial difficulties of municipalities the problem of vertical equity cannot successfully be attacked at the municipal level. Moreover, it is doubtful, to say the least, that significant improvements in the income distribution would arise as an unintentional by-product of pricing policies of municipal services. General revenue financing of refuse collection services is to a large extent synonymous with property tax revenue financing and an examination of the qualities of the property tax will therefore give some indications of the theoretical characteristics of this method of financing. The property tax is better known for its absolute revenue importance at the municipal level than for its theoretical clarity. In fact,

> "...neither the benefits-received nor the ability-to-pay principles of tax equity is served adequately by the property tax....The overall allocation and distribution distortions found with property tax usage are not only extensive but also are negative (irrational) in many instances."[1]

These undesirable attributes of the property tax together with the regressive effects caused by unsatisfactory assessment practices tend to severely discount the equity argument of general revenue financing.

B. P. Herber, Modern Public Finance (Richard D. Irwin, Inc., Homewood, Illinois, 1967), pp. 294-95.

One obvious advantage of pure general revenue financing is its administrative convenience. It is not necessary to issue bills, to present tickets, or to keep track of the quantities of refuse generated. It must be realized, however, that this advantage is only gained by completely abandoning the benefit principle.[1] The amount of service consumed by an individual has no longer any bearing on the share of the costs borne — the functional link between price and quantity has been cut. Many municipalities in recognizing this problem have resorted to some system of mixed financing by establishing a maximum limit above which there is a service charge for refuse collection.[2] If the limit is sensible, that is, low enough, much of the administrative convenience is lost because service charges have to be levied; if it is not, the above problem of inequity in service consumption has not been solved.

Finally, two advantages arise if general revenue financing is combined with a complete collection service of all types of refuse from all sources. Then all properties receive the service, ensuring the safe disposal of all waste materials. Furthermore, the collection service may in this case be performed by a single agency and the duplication of equipment and certain administrative functions can be avoided. Thus the number of complaints can be minimized and the efficiency of the operation increased if this particular system of collection and financing is adopted. These advantages would have to be weighed against the inequities inherent

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[1] It has been mentioned above that the property tax, the main revenue producer for the general revenue fund, does not meet the benefit principle adequately. Besides this, the link would not be functional anyhow.

[2] For example, a maximum of 1 cubic yard is collected free of charge from dwellings in the City of Edmonton.

in general revenue financing which are accentuated by the disproportionate share of expenditures required to collect the relatively large amounts of commercial and industrial refuse.

A serious drawback of general revenue financing must be mentioned: not only does it not distribute the cost of the service on an ability-to-pay basis but "the assessed value of a property may have no relation to the amount of refuse that must be collected from that property, or to the comparative cost of providing the service."[1] A further, although quantitatively small, point is that tax exempt properties, for example churches, receive free collection services which creates an undue burden for the taxpayers.

A last consideration may be that general revenue financing, by not being immediately tied to the collection operation, does not induce the consumer to use the service responsibly; this applies particularly to the preparation of refuse for collection.

The maximum quantities of refuse collected free of charge from residential properties in the City of Edmonton are one cubic yard per week from dwellings and one fifth of a cubic yard from apartment houses.[2] These limits do not have to be enforced as they are fixed too high to serve any real purpose. As a general practice the collectors pick up all refuse and it would be only in exceptional cases, for

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[1] American Public Works Association, Refuse Collection Practice, p. 272.

[2] The City of Edmonton, A Bylaw of the City of Edmonton Regulating the Collection of Waste, Bylaw No. 1895 (Edmonton, March 1958), Sect. 17 (1) and (2), p. 10.

example, when excessive amounts of construction or demolition wastes are generated, that the residential service charge comes into effect. The arbitrary character of the limits is certain to give rise to inequities. Based on 1968 cost figures a family living in a single family dwelling received free of charge services equivalent to a maximum of $92 per year while a family occupying an apartment could receive an equivalent of $18 per year free of charge.[1] It is evident that these amounts would only coincidentally correspond to the amount of property tax paid and the quantity of refuse generated by any individual family in a year. The result is again an unequal and irrational distribution of the cost of the service.

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[1] Computed from the City of Edmonton, Engineering Department, Sanitation Division, Annual Report, 1968; a weighted average for disposal costs and the following approximations were used: 6.5 cubic yards per ton, 5 large containers per cubic yard.

CHAPTER IV

THE APPLICATION OF SERVICE CHARGES TO REFUSE COLLECTION

In the past century the benefit principle, once the dominant standard for the distribution of tax burdens, has been widely succeeded by the ability-to-pay principle.[1] This development may be ascribed largely to the strong demands on governments to meet social needs and to influence the income distribution according to current ideas of equity.

While it is often difficult or even impossible to attribute to the individual the benefits from governmental services on the federal or provincial level, for example, in defense or pollution abatement, this is frequently not so in the case of services provided by municipal governments. Here the degree to which the individual is benefited can often be determined and the benefit principle utilized.

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[1]The benefit principle is, in brief, based on the idea of the quid pro quo while the ability-to-pay approach "denies the possibility of imparting benefit shares to individuals." R. A. Musgrave, The Theory of Public Finance (New York: McGraw-Hill Book Company, 1959), p. 90.

> While no panacea, badly-needed municipal revenues can be equitably and efficiently gathered by a carefully-thought-out policy of benefit taxation or fee charging as a supplement to existing ability-to-pay taxation in areas of social benefit.[1]

In the case of refuse collection services the connection between costs and benefits appears to be evident and measureable and it is therefore possible to link them by levying direct charges on the users of the service.

Theoretical Pricing Problems and Their Relation to Refuse Collection

Before embarking on a discussion about the possible bases for a service charge on refuse collection it may be in order to consider the major alternative pricing principles that may be utilized in the determination of service charges.[2]

1. value of service
2. welfare principle
3. cost of service
   a. marginal cost
   b. average cost

The value of service principle may be applied when a service is provided but no basis exists for computing or estimating the cost; for example, when private goods are stored on a street or on other public property. Then the service charge may be based on the estimated value to the user.

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[1] Garth L. Mangum, "The Benefit Principle: An Unexploited Source of Municipal Revenues and Investment Decisions," Municipal Finance (February, 1962), p. 128.

[2] See Boyle, Service Charges, p. 41 and William Hunrick, Jr., "Reasonable Use of Service Charges," Municipal Finance (November 1960), p. 82.

The working criterion for the welfare principle is the ability to pay. The charges are usually arranged on a sliding scale with income--the most common measure of the ability to pay--determining the amount of the charge. The service may be provided free of charge to users with an income below a certain minimum level.

As it is usually the objective of imposing a service charge to recover the cost of providing the service from the users, the cost of the service is a frequently used pricing principle. If the base is marginal cost, the amount of the charge depends on the cost of supplying an additional unit of service. This method thus necessarily involves the subsidizing of decreasing cost industries. In the case of average cost the total cost is simply divided by the total number of units produced and each individual is charged the resulting average cost price per unit multiplied by the number of units consumed by him.

There has been a long discussion in the economic literature about the relative merits of marginal cost pricing. While it is unnecessary for the purpose of this study to examine the numerous arguments and counterarguments, it may be pointed out that there are avid proponents of this method of pricing.[1] A

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[1]See, for example, Harold Hotelling, "The General Welfare in Relation to Problems of Taxation and of Railway and Utility Rates", Econometrica, 6 (1938), pp. 242-269 and William S. Vickrey, "Some Implications of Marginal Cost Pricing for Public Utilities", American Economic Review, Vol. 45 (May, 1955), p. 618. Vickrey modified his stand greatly in a later article, saying that "...by virtue of the principle of the 'second best', if any specific charges are to be made, they should in nearly all cases be designed in part to contribute to the public treasury over and above the amount that would flow in on the basis of charges strictly reflecting marginal costs." W. S. Vickrey, General and Specific Financing of Urban Services", in: American Economic Association, Readings in Welfare Economics (Homewood, Illinois: Richard D. Irwin, Inc., 1969), p. 563.

thorough analysis of marginal cost pricing reveals, however, that the requirements for a successful implementation of this system of pricing are so difficult to meet as to render marginal cost pricing a mere theoretical concept.[1] This even applies to public utility companies operating under decreasing cost conditions for which marginal cost pricing has been most frequently advocated.

Having ruled out marginal cost pricing on practical grounds one may briefly look at its relation to the service of refuse collection and disposal. Even if refuse is incinerated, which it will not be in the City of Edmonton in the near future, the dominant cost item still remains the operating cost of collection. The case for marginal cost pricing as opposed to average cost pricing is strongest for activities which require a relatively large investment in fixed plant due to indivisibilities and in operations with overcapacities. In the former case the marginal cost of increasing the output is relatively small and in the latter case few or no alternatives are foregone when the output is increased. The price of the product should, therefore, be either very low or even zero if maximum welfare is to be achieved. These conditions do not apply to refuse collection services. Moreover, a reduction in the price from average to marginal cost, assuming such was the case, could not reasonably be expected to result in a significant expansion of output, that is, of the quantity of refuse generated and collected. For this particular service the quantity appears to be fixed and, within limits, independent of the price.

It may be concluded that the service of refuse collection should be priced

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[1]See Nancy Ruggles, "Recent Developments in the Theory of Marginal Cost Pricing," The Review of Economic Studies, Vol. II (1949-50), p. 121.

at average cost, including depreciation and debt charges on the publicly-owned facilities. Aside from theoretical considerations this method of pricing recommends itself on the basis of practical policy.

Service Charges for Refuse Collection

The pricing of municipal services usually takes place under considerable political pressure with the result that frequently political expediency takes precedence over economic considerations. The result is that fees and service charges are usually designed irrationally and that the use of the benefit principle is often haphazard and inconsistent in many cities. An awareness of both advantages and limitations inherent in the use of service charges for government operations, especially for quasi-public utilities like refuse collection and sewerage, suggests that they must be carefully designed and structured.[1] Operations research and econometric techniques would facilitate the search for efficient methods of operation and financing.

Bases for Rate Structures

After the underlying pricing principle has been selected the choice of a suitable base of measurement for the amount of refuse collection service charges is probably the most important decision. It will not only affect the administrative costs markedly, but will also have pronounced effects on the equity of the whole system of financing. Municipalities often choose, therefore, to combine two or

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[1] Jacob A. Stockfisch, "The Outlook for Fees and Service Charges as a Source of Revenue for State and Local Governments," National Tax Association, Proceedings of the 16th Annual Conference, 1967, p. 91.

more bases and to use different ones for residential and nonresidential customers. The choice of each city will depend on the particular objective to be achieved and on local peculiarities such as population density, types of refuse and geographical conditions. The following bases are commonly used in Canada and the United States:[1]

1. Uniform charge for each service. This simple rate structure does not take account of the quantity of refuse collected. In order to avoid unfair treatment of customers it should only be applied in residential districts of small communities which contain predominantly one or two family dwellings. The number of rooms may serve, in a rough way, as an approximation of the amount of refuse generated. It should only be used in residential areas.

2. Number of dwelling units or apartments. Another residential rate structure which may be combined with the uniform charge to introduce differential flat rates for single, duplex, and row houses and apartment buildings.

3. Number of containers. The number of containers provides a relatively exact estimate of the quantity of refuse collected and is thereby a good measure of the benefit received. If containers of different sizes are in use, as is the case in the City of Edmonton, the service charge could be based on the largest container which would induce households and businesses to replace smaller containers with those of the maximum allowable size.[2] The administrative work of collection crews would be minimized if the City were to provide its own standard containers. As

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[1] American Public Works Association, Refuse Collection Practice, pp. 277-279.

[2] The containers presently used in the City of Edmonton hold approximately one-fifth, one-sixth and one-seventh of one cubic yard.

collection conditions appear to be very similar throughout the City of Edmonton this basis would measure the cost of collection fairly accurately.

4. Size of the containers. The size of containers also permits a good estimate of the amount of refuse removed. This method is administratively more involved than the above one as the choice of the container size is left to the individual customer. If this rate structure is extended to include commercial and industrial establishments, either a maximum limit on the container size will have to be imposed or mechanical loading equipment must be employed.

5. Measured volume of refuse. This method is more suited for commercial and industrial properties than for residential areas. The regular service charge is usually established on the basis of actual measurements made during a certain number of collections. The City of Edmonton establishes the service charges for nonresidential properties in this way.

6. Frequency of collection. This method is often combined with a quantity method of service charge determination when the individual customer has an option as to the number of collections per week. It applies more to commercial and industrial customers than to households; the number of collections in residential areas is usually fixed.

In addition to the bases for rate structures mentioned above there are a number of auxiliary methods for establishing service charges for refuse collections which take local or individual characteristics into account. For example, the floor space of buildings, the distance from collection vehicles to containers, the class of refuse, the promptness of service, and the topography of the collection area.

While it appears to be satisfactory to base residential rates primarily on the quantity of refuse collected, for example, through the number or the size of containers, commercial and industrial properties will probably be best served by combining frequency and quantity as a base and by using large containers of various sizes.

Physical Implications

It hardly bears repeating that the primary function of any economic system is the efficient allocation of scarce economic resources. Looking at the service of refuse collection under this aspect one cannot help but conclude that the problem of resource allocation has not been dealt with satisfactorily in the City of Edmonton. At the present time there are as many as nine collection agencies operating in the City, including the municipal departmental service. The plurality of refuse collection agencies resulted in a multiplication of collection equipment and personnel, administrative and other overhead costs, and supervisory personnel and represents a sizeable misallocation of resources.[1] J. S. Mill, writing as early as 1848, observed that utility services in London could be provided at lower cost if they were supplied by a single company instead of the many.

> When, therefore, a business of real public importance can only be carried out advantageously upon so large a scale as to render the liberty of competition almost illusory, it is an unthrifty dispensation of the public resources that several costly sets of arrangements should be kept up for the purpose of rendering to the community this service. It is much better to treat it at once

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[1] Casual observation shows that there are sometimes two or more different collection agencies concurrently operating in the same vicinity.

> as a public function; and if it be not such as the government itself could benefically undertake, it should be made over entirely to the company or association which will perform it on the best terms for the public.[1]

Due to the restrictive conditions of the Bylaw and the method of general revenue financing the wasteful duplication of capital and labor may have been unavoidable in the City of Edmonton.[2] The formation of a single collection agency responsible for the collection of all types of refuse from residential, commercial, industrial, and other property would eliminate this problem. Service charge financing of the entire collection and disposal service would permit a businesslike operation and provide the possibility for maximum efficiency.

Both the size and the type of the operation appear to favor public rather than private ownership of the collection agency. The most pertinent reasons would include, firstly, the presence of social benefits which modify the profit motive; secondly, the present and future requirement for large capital investments in collection equipment and disposal facilities; thirdly, the risk of failure of private enterprise; and, fourthly, the administrative costs which would be prohibitive for a private company but can be incorporated with relative ease into the billing procedures for other municipal services. The service charge method of financing would allow the municipal agency to be operated as a public utility company.

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[1] John Stuart Mill, Principles of Political Economy, (New York: The Colonial Press, 1900), Vol. I, p. 141; see also p. 131 for a further example.

[2] See American Public Works Association, Refuse Collection Practice, p. 292.

The type of collection equipment used is not immediately influenced by the prevailing method of financing; it is rather determined by the location of the disposal facilities, the desired quality of working conditions for the collection crews, and the availability of either municipal or internal investment funds. But the physical plant should in any case be so diversified as to permit the single collection agency to render to its customers a quality of service which at least measures up to, if not surpasses, the one provided before the amalgamation of the collection agencies.

Administrative Considerations

In an appraisal of the service charge method of financing refuse collection services, the administrative overhead costs have to be taken into account because they form a significantly larger part of the total costs than under the system of general revenue financing. The administrative costs are influenced mainly by the degree of sophistication of the rate structure and the method of collecting the charges. They generally are the lower, the more arbitrary the rate structure is. These two factors would have to be weighed against each other when setting up the system. The cost of billing and collecting the charges depends to a large extent on the possibility of utilizing an already existing accounting and billing system.

Judging by the experience of several cities employing modern utility systems of billing and collecting, an administrative expense of ten to thirteen per cent of total operating cost is still considered to be normal.[1] The City of Edmonton, for

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[1] American Public Works Association, Refuse Collection Practice, p. 293.

example, has a Consumer Service Department which handles much of the administrative work for three public utilities--Edmonton Power, Edmonton Telephones, and Edmonton Water. The Department provides application, billing, and collection services and works in close collaboration with the Treasurer's Division and the Data Processing of the Finance Department. The former receives the payment of the bills and the latter processes the bills and records the payments through an electronic data processing system.[1] The incorporation of the billing procedures for refuse collection service charges into the system of the Consumer Service Department would be cheaper and probably more efficient than setting up a separate system.

Including refuse collection charges in the joint monthly utility bill and making provisions for the discontinuation of all services in case of delinquent refuse collection accounts would instantaneously alleviate the problem of dealing with arrears in payments. The mere interruption of the refuse collection service is impractical as it creates a public health hazard.

The cost of billing and collecting for six American cities, having a city operated service and covering one hundred per cent of the cost of the service through service charges, varied between 2.2 and 9.0 per cent of the cost of the service.[2] It is interesting to note that the lowest percentage was found in a city which included the refuse service charge on the water bill. By comparison, the city administration

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[1] Julian G. Suski, Edmonton (Edmonton: The City of Edmonton, 1965), p. 56.

[2] Carl Schneider, "Refuse Service Charges," The American City (May, 1953), p. 92.

overhead for refuse collection and disposal was computed to be 2.75 per cent of operating costs in the City of Calgary.[1] The annual additional operating costs of including a service charge for refuse collection on the utility bill was estimated to be $10,000 per year, amounting to an additional 0.5 per cent of total operating costs. If these figures indeed reflect the total administrative costs, and if a similar situation can be assumed to exist in the City of Edmonton, administrative considerations would not present an obstacle for the implementation of the service charge method of financing refuse collection and disposal.

Revenue Potential

As the prime reason for introducing service charges for refuse collection usually is to increase the revenues of the municipal government, it may be beneficial to provide some information on the revenue potential of this particular source.

Municipal governments generally plan to recover only the cost of providing the collection service from service charge revenues, that is, they do not have the intention to make a profit and to add thereby to the general revenue fund.[2]

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[1]The City of Calgary, Finance Department, Economic Division, Financing Refuse Collection and Disposal (Calgary, 1968), pp. 4 and 10.

[2]The costs of the service should be understood to include operating cost, depreciation and debt charges, and allowance for expansion. The deliberate pricing of utility services high enough to earn a substantial profit is widely accepted. It may be looked at as a hidden tax and has, due to the regressive nature of service charges, undesirable redistributional aspects. Moreover, as the profits are usually channelled into the general revenue fund, the nonusers of the service, or services, are being subsidized by the users. The argument that the profits constitute a reasonable return on the investment does not really apply because in the case of public utilities the investors are, after all, the customers and any return on the investment should benefit them. The simplest way of doing this is by lowering the price of the service. The profit may, however, be justified on other grounds, for example, on the basis of rating cost of financing requirements for capital.

A comparison of nine Canadian and United States cities with a population of over 100,000 which financed 100 per cent of the total cost of refuse collection and disposal through service charges shows an average per capital revenue of $4.86 in 1960.[1] This figure must be interpreted carefully, because the size of the standard deviation indicated that the conditions of providing this service vary widely among the cities. If, however, service charges corresponding to this average rate had been applied in the City of Edmonton in the year 1960, the ensuing revenue of $1,308,866 would have been more than sufficient to pay for the cost of the service which amounted to $964,986.[2]

It should be noted that the following potential revenue estimates for the City of Edmonton are meant to provide no more than a general impression of the order of magnitude involved in the service charge financing of refuse collection. No claim is made concerning the exactness of the final figures because there are too many imponderable factors which cannot be precisely determined for the purpose of this study.

With a collection cost of $10.67 per ton and a weighted average disposal cost of $0.84 per ton, the total cost of collecting and disposing of one ton of refuse amounted to $11.51 in the City of Edmonton in 1968.[3] At an average of 6.5 cubic yards per ton of refuse, the collection cost per cubic yard was $1.77.

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[1]The standard deviation is $1.71. See Appendix II, Table 16.

[2]See Appendix II, Tables 13 and 15.

[3]Calculated from the City of Edmonton, Engineering Department, Sanitation Division, Annual Report (1968).

The three types of containers used in the City have a holding capacity of one-fifth, one-sixth, and one-seventh of one cubic yard for the large, medium, and small container respectively. Based on the above cost figures the respective service costs were $0.35, $0.30, and $0.25 for the large, medium, and small container. Using only the large container, the monthly collection cost for one container per week would be $1.50, that is, $18.00 per year, and a multiple thereof for each additional container.

The population of the City of Edmonton was 410,105 in 1968.[1] Given an average of 3.5 persons per household in Edmonton, there were 117,173 households in 1968.[2] With a ratio of approximately two to one of households living in single detached and attached dwellings versus households living in flats or apartments,[3] there were 78,115 households in single, duplex, or row houses and 39,058 in apartments. As the average number of persons per household is significantly larger in the case of detached and attached dwellings than in the case of apartments[4] it may be assumed that the former requires two and the latter one refuse container per week. On this basis the total revenue to the City from residential refuse collection and disposal would amount to $292,935 per month, or $3,515,220 per year. These

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[1] See Appendix VI, Table 3.

[2] It is assumed here that the average number of persons per household, 3.5 in 1966, has not changed. Canada, Dominion Bureau of Statistics, Census of Canada, 1966, Vol. II (April, 1968), Table 11.

[3] Canada, Dominion Bureau of Statistics, Census of Canada, 1966, Vol. II (May, 1969), Table 51.

[4] Canada, Dominion Bureau of Statistics, Census of Canada, 1966, Vol. II (June, 1969), Table 45.

figures appear to be reasonable when compared to the total cost of refuse collection and disposal which amounted to $1,690,672 in 1968. The actual cost figure could be expected to approach the above estimate if, firstly, the municipal collection service would include all households currently serviced by private collectors, secondly, if the increase in administrative cost is considered, and, thirdly, if allowance is made for the expansion of facilities and research and further development of the present techniques.

Commercial and industrial customers could be served at the same rates that apply to residential customers if they use the same type of container. Rates similar to those above or individual rates would have to be established if bulk containers are used.

As mentioned before, both residential and nonresidential rates may be based on more criteria than the single one used above--the number of containers.

Critical Evaluation of Service Charge Financing

In the evaluation of the service charge method of financing refuse collection, the revenue aspect is of paramount importance. It is the pressing need for additional funds at the municipal level that instigated the search for untapped revenue sources. The revenue adequacy will, therefore, carry more weight than any other single factor in the decision about acceptance or rejection of this particular method of financing, barring political considerations. This is contrasted by Stockfisch's statement that "the most important advantage to be derived from fees and service charges lies in their potential as a means of subjecting programs and operations to the discipline of

the market test."[1] The market test with its effect on resource allocation is unquestionably of relevance in the case of refuse collection, especially if it replaces, totally or in part, the political evaluation process governing resource allocation and utilization, but to consider the revenues derived from fees and service charges as a mere "by-product"[2] appears to be an underestimation of the severity of the fiscal problems which confront municipal governments. It has been shown above that refuse collection service charges can be designed in such a way as to produce revenues sufficient to cover the total cost of the service, that is, they meet the criterion of revenue adequacy. This statement is, however, subject to the condition that a relatively inexpensive method of billing and collecting the charges can be found. If refuse collection charges can be introduced successfully, either general property taxation may be reduced by the amount used for refuse services, or such revenues may be employed for other municipal services,[3] particularly for those which yield significant social benefits.

Almost all municipal revenue sources have the unlaudable characteristic of being regressive;[4] this generally applies to service charges even more than to the property tax. Insofar as the municipal government wishes to use neutral or 'positively' corrective modes of financing, in terms of the redistributional effects,

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[1]Stockfisch, "The Outlook," p. 89.

[2]Ibid., p. 90.

[3]American Public Works Association, Refuse Collection Practice, p. 274.

[4]See W. Irwin Gillespie, The Incidence of Taxes and Public Expenditures in the Canadian Economy, Studies of the Royal Commission on Taxation, No. 2 (Ottawa: Queen's Printer, 1966), p. 65 and Boyle, Service Charges, p. 46.

a conflict of objectives arises. There is, on the one hand, the necessity to utilize all potential revenue sources and, on the other hand, the desire to further vertical equity.[1] However, as the collection charges per household are not very large and it is widely held that "redistribution of income in kind is an inefficient method of securing equality,"[2] the revenue potential usually becomes the overriding objective.

Under the system of service charge financing each household only pays according to the benefits received. This ensures a degree of horizontal equity that does not exist if the service is financed out of the general revenue fund. Any kind of equality under the general revenue system appears to be incidental to the method of financing.

If refuse collection service charges are put on the utility bill the resulting monthly cash flow would be an additional advantage. In the City of Edmonton this would amount to more than $200,000 from residential properties alone.

By introducing service charges and establishing the municipal agency as the sole collector a more comprehensive and cheaper service becomes available to all properties in the municipality. The cost of the service to ordinary residential properties is not likely to change very much provided an efficient administrative procedure can be found. The removal of certain classes of refuse, for instance, construction wastes, from residential properties and the removal of trade wastes can, however, be expected to be less expensive than the private collection service.

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[1] Horizontal equity--people in the same circumstances pay the same amount; vertical equity--people in different circumstances pay different amounts.

[2] Procter Thomson, "Prices versus Taxes in the Allocation of Public Resources, National Tax Association, Proceedings of the 4th Annual Conference, 1955, p. 155.

This is so, firstly, because the service can be provided at cost and, secondly, because of the more efficient operation of a single collection agency. The experience of other cities shows that it is advisable to require all properties to use the municipal collection service.[1] If this is not done, unsanitary conditions or litter problems may result, caused by people who refuse to purchase the refuse service on the grounds that they cannot afford it or that they can dispose of their refuse themselves.

An important consideration is that the system of service charge financing has a high degree of flexibility. This is advantageous in two respects. Firstly, on the financial side, periodic reviews and updating of charges for certain kinds of service are possible, not only when collection conditions change but also in response to increases in the general price level. Secondly, on the physical side, this type of financing lends itself to the introduction of charges for new or experimental methods of collection such as containerization.[2] This feature is essential as both collection and disposal methods change under the impact of rapid urbanization and technology.

Lastly it should be noted that the introduction of service charge financing requires a certain amount of public relations expenditures both in the preparatory stage to ensure understanding and cooperation of the general public, and after it has started operating. Particularly in the initial stages numerous complaints must be expected regarding the rates charged and the quantities involved. The handling of these complaints represents additional costs which most likely will decline, however, as the new system becomes routine to the agency and accepted by the public.

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[1] American Public Works Association, Refuse Collection Practice, p. 274.

[2] Ibid., p. 274.

CHAPTER V

SUMMARY AND CONCLUSION

After a review of present trends in Canadian municipal finance one may tend to conclude that

> Increasing population and urbanization, increasing demands for more and higher quality municipal services and increasing costs of providing them suggest a municipal finance problem of crisis proportions in the foreseeable future.[1]

While the recognition of this fact was the prime motive for this study, it was also realized that the effects of these developments would be more easily coped with in some cities than in others, the relative ease depending mainly on the financial resources. Under this aspect the City of Edmonton finds itself in a better position than many other Canadian municipalities and it was correctly pointed out elsewhere that "there can be no talk of impending fiscal disaster."[2] But the need for additional revenues nevertheless remains in view of future requirements. In this situation a foresighted examination of alternative revenue sources is called for.

As an internal source of revenue for the City of Edmonton the imposition of a service charge for refuse collection has been examined. This method of

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[1]Mangum, Benefit Principle, p. 135.

[2]Michael C. Hodgson, "The Fiscal Development of the City of Edmonton Since 1946" (unpublished M.A. thesis, University of Alberta, 1965), p. 154.

financing was contrasted to the present method under which the service is financed predominantly out of the general revenue fund. There do not appear to be unmanageable problems in the implementation of service charges for refuse collection. Undesirable side effects on income distribution appear to be weak due to the relatively small individual payments involved. The revenue potential may, therefore, become the most decisive factor in a review of the mode of financing refuse collection services.

The view has been advanced that a public utility company could be the possible organizational form of this particular municipal enterprise and it was found that a price corresponding to the average cost of providing the service appeared to be feasible both from an operational and distributional point of view.

The decision about the method of financing as well as that on the organizational set-up of the enterprise is in the end a political one. Many municipalities in Canada and in the United States have proven that political considerations can be made to harmonize with economic and financial necessities in this particular case. But it should also be noted that in order to solve the municipal 'crisis' a more comprehensive solution has to be found. However, a thorough review of the system of municipal services and where needed a modernization of its parts, leading to a sound utilization of all revenue sources, is a step in the right direction and a good base in negotiations with other levels of government.

APPENDIX I

A PARTIAL LIST OF POTENTIAL ADDITIONAL REVENUE SOURCES FOR MUNICIPAL GOVERNMENTS

1. Increase in existing municipal taxes, especially the property tax.
2. Increase in existing service charges.
3. Imposition of new taxes, especially a city income tax.
4. Imposition of new service charges, especially for sewerage and refuse collection.
5. Increased provincial grants.

APPENDIX II

TABLE I

URBAN AND RURAL POPULATION IN CANADA AND ALBERTA

Selected Years 1941 - 1966[1]

	1941	1951	1956	1961	1966
Urban Canada	6,502,779	8,628,253	10,714,855	12,700,390	14,726,759
Rural Canada	5,003,876	5,381,176	5,365,936	5,537,857	5,288,121
Urban Alberta	265,529	449,675	635,824	843,211	1,007,407
Rural Alberta	530,640	489,826	487,292	488,733	455,796
Farm Canada	--	2,827,732	2,631,587	2,072,785	1,913,714
Farm Alberta	--	339,955	327,201	285,823	277,598

Source: Canada, Dominion Bureau of Statistics, Canada Year Book, (Ottawa: Queen's Printer, 1952 - 53), p. 144; (1957 - 58), p. 122; (1968), p. 194.

[1]For all years 1951 definition; see Canada Year Book, 1952 - 53, p. 143.

TABLE 2

URBAN AND RURAL POPULATION IN CANADA AND ALBERTA

IN PER CENT OF RESPECTIVE TOTALS

SELECTED YEARS 1941 - 1966

	1941	1951	1956	1961	1966
Urban Canada	56.51	61.59	66.63	69.64	73.58
Rural Canada	43.49	38.41	33.37	30.36	26.42
Urban Alberta	33.35	47.86	56.61	63.31	68.85
Rural Alberta	66.65	52.14	43.39	36.69	31.15
Farm Canada	--	20.18	16.36	11.37	9.56
Farm Alberta	--	36.18	29.13	21.46	18.97

Source: Table 1.

TABLE 3

POPULATION AND AREA OF

THE CITY OF EDMONTON

1941 - 1968

Year	Population	Area (acres)	Year	Population	Area (acres)
1941	93,929	27,000	1955	209,353	27,661
1942	96,725	27,000	1956	224,003	27,661
1943	105,536	27,000	1957	238,353	27,661
1944	108,416	27,000	1958	252,131	28,672
1945	111,745	27,000	1959	260,733	36,141
1946	114,976	26,777	1960	269,314	36,909
1947	118,541	26,777	1961	276,018	36,909
1948	126,609	26,941	1962	294,967	43,949
1949	137,469	26,941	1963	303,756	43,949
1950	148,861	26,941	1964	357,696	54,784
1951	158,912	26,941	1965	371,265	54,784
1952	169,196	26,941	1966	381,230	54,784
1953	183,411	26,941	1967	393,563	54,784
1954	197,836	27,661	1968	410,105	56,128

Source: The City of Edmonton, Financial Statements and Annual Reports, 1941 - 1967.

TABLE 4

REVENUES AND EXPENDITURES OF MUNICIPAL GOVERNMENTS IN CANADA, 1947 - 1967

IN MILLIONS OF DOLLARS

Year	Mun. Tax Revenue	Mun. Rev. excl. Transfers	Total Mun. Revenue	Mun. Exp. excl. Transfers	Total Mun. Expenditure
1947	363	455	556	587	594
1948	407	519	640	715	724
1949	449	556	713	809	819
1950	503	624	796	898	909
1951	580	715	914	1,015	1,028
1952	660	809	1,027	1,157	1,170
1953	717	874	1,119	1,274	1,289
1954	772	945	1,206	1,377	1,392
1955	851	1,040	1,374	1,556	1,578
1956	958	1,063	1,534	1,789	1,807
1957	1,068	1,288	1,756	2,021	2,049
1958	1,175	1,417	1,985	2,284	2,301
1959	1,317	1,574	2,220	2,537	2,561
1960	1,458	1,726	2,472	2,845	2,862
1961	1,550	1,832	2,707	3,108	3,123
1962	1,679	2,000	3,107	3,474	3,489
1963	1,828	2,181	3,381	3,783	3,800
1964	1,932	2,309	3,642	4,063	4,080
1965	2,134	2,535	4,703	4,576	4,598
1966	2,388	2,808	4,616	5,188	5,218
1967	2,645	3,086	5,305	5,616	5,654

Source: Canada, D.B.S., National Accounts, Income and Expenditure, 1926-1956, 1956-1967, Cat. No.: 13-201.

TABLE 5

REVENUES OF THE CITY OF EDMONTON

1947 - 1968 IN THOUSANDS OF

CURRENT DOLLARS

Year	Total Tax Revenue	Other Non-Transfer Revenue	Total Own Revenue	Transfer Payments[a]	Total General Revenue
1947	4,980	1,411	6,391	-	6,391
1948	5,444	1,661	7,105	-	7,105
1949	6,028	2,189	8,217	-	8,217
1950	7,388	2,331	9,719	-	9,719
1951	9,253	2,224	11,447	274	11,751
1952	11,574	2,505	14,079	421	14,500
1953	12,180	3,471	15,651	1,162	16,813
1954	13,644	3,825	17,649	1,564	19,033
1955	14,785	3,794	18,579	1,667	20,246
1956	17,021	4,506	21,527	1,841	23,386
1957	19,359	5,915	25,274	2,318	27,592
1958	22,242	7,644	29,886	2,782	32,668
1959	24,902	8,431	33,333	2,786	36,119
1960	27,347	9,862	37,209	2,875	40,084
1961	29,611	10,020	39,631	3,876	43,507
1962	33,259	11,794	45,053	3,843	48,896
1963	35,116	12,660	47,776	4,048	51,824
1964	36,350	16,201	52,551	4,621	57,172
1965	41,090	16,206	57,296	5,271	62,567
1966	43,145	18,324	61,469	6,458	67,927
1967	46,775	21,395	68,170	7,943	76,113
1968	54,566	24,615	79,181	9,108	88,289

Source: The City of Edmonton, Financial Statements and Reports, 1947 - 1968.

[a]Transfer Payments include "Municipal Assistance Fund" and items in the category "Government Grants - Other."

TABLE 6

EXPENDITURES OF THE CITY OF EDMONTON 1947 - 1968 IN THOUSANDS OF CURRENT DOLLARS

Year	Current Expend.	Capital Expend.[a]	Debent. Repay-ment[b]	Capital E. Charged to Curr. Acct.	Total Expend.
1947	6,391	1,566	701	42	7,214
1948	7,104	2,753	664	83	9,110
1949	8,216	4,230	684	259	11,503
1950	9,717	6,634	759	343	15,249
1951	11,748	6,829	988	142	17,447
1952	14,498	8,741	1,113	848	21,278
1953	16,796	13,223	1,383	649	27,987
1954	19,022	16,100	1,738	411	32,973
1955	20,242	14,083	2,447	444	31,434
1956	23,365	20,520	3,339	244	40,302
1957	27,589	16,736	3,886	548	39,891
1958	32,663	19,453	4,236	44	47,836
1959	36,112	15,873	4,838	199	46,948
1960	40,082	13,161	5,210	261	47,772
1961	43,503	13,429	5,339	33	51,560
1962	48,892	11,818	5,977	288	54,445
1963	52,404	14,052	6,285	2	60,169
1964	57,150	17,811	6,442	818	67,701
1965	62,521	21,244	6,751	-	77,014
1966	67,199	25,219	7,129	-	85,289
1967	74,936	28,934	7,714	-	96,156
1968	87,380	31,580	8,049	-	110,911

Source: The City of Edmonton, Financial Statements and Reports, 1947 - 1968.

[a] Excluding utilities.

[b] 1960 - 1968 as of "Debenture Repayment"; 1950 - 1958 as of The City of Edmonton, Statistical Information for the Department of Municipal Affairs, Analysis of Debenture Debt Charges; 1947 - 1949 as follows: apply 1950 - 1951 ratio of 70 per cent principal to 30 per cent interest to the sum of General Debt and Local Improvement Debt (P.S.), as of Financial Statements. Excluding Utilities.

TABLE 7

CLASSIFICATION OF REFUSE MATERIALS

Garbage	Wastes from the preparation, cooking and serving of food Market refuse, waste from the handling, storage, and sale of produce and meats		From: households institutions and commercial concerns such as: hotels stores restaurants markets, etc.
Rubbish	Combustible (primarily organic)	Paper, cardboard, cartons Wood, boxes, excelsior Plastics Rags, cloth, bedding Leather, rubber Grass, leaves, yard trimmings	
	Non-combustible (primarily inorganic)	Metals, tin cans, metal foils Dirt Stones, bricks, ceramics, crockery Glass, bottles Other mineral refuse	
Ashes	Residue from fires used for cooking and for heating buildings, cinders		
Bulky wastes	Large auto parts, tires Stoves, refrigerators, other large appliances Furniture, large crates Trees, branches, palm fronds, stumps, flotage		

TABLE 7 - Continued

Street refuse Dead animals	Street sweepings, dirt Leaves Catch basin dirt Contents of litter receptacles Small animals: cats, dogs, poultry, etc. Large animals: horses, cows, etc.	From: streets sidewalks alleys vacant lots etc.
Abandoned vehicles	Automobiles, trucks	
Construction and Demolition wastes	Lumber, roofing, and sheathing scraps Rubble, broken concrete, plaster, etc. Conduit, pipe, wire, insulation, etc.	
Industrial refuse	Solid wastes resulting from industrial processes and manufacturing operations such as: food processing wastes, boiler house cinders, wood, plastic, and metal scraps and shavings, etc.	From: factories power plants etc.
Special wastes	Hazardous wastes: pathological wastes, explosives, radioactive materials Security wastes: confidential documents, negotiable papers, etc.	From: households hospitals institutions stores industry, etc.
Animal and Agricultural	Manures, crop residues	farms feedlots
Sewage treatment residues	Coarse screenings, grit, septic tank sludge, dewatered sludge	sewage treatment plants septic tanks

Source: American Public Works Association, Refuse Collection Practice, p. 15.

TABLE 8

GROUP I MUNICIPAL GOVERNMENTS

SERVICE CHARGES IMPOSED FOR EACH

CATEGORY OF REFUSE COLLECTION

City, Province	Collection Service						Basis of Financing	Use of Private Contractors	Per cent Self-Supporting
	Domestic Garbage	Domestic Rubbish	Commercial Garbage	Commercial Rubbish	Industrial Wastes	Other Refuse			
Kamloops, B.C.	c	c	c	c	ns	ns	D	No	100
St. John, N.B.	c	c	c	c	c	nr	C	No	60
Quebec, Que.	c	c	c	c	pc	nr	D	No	100
Sherbrooke, Que.	c	c	ns	ns	ns	nr	C	No	70

Where: c - service is rendered and a charge is applied to the service.
pc - service is rendered and a partial charge is applied to the service or a portion thereof.
ns - no service is performed.
nr - no response to question.
A - service is financed solely from general revenue.
B - service is financed primarily from general revenue and secondarily from s. ch.
C - service is financed primarily from service charges and secondarily from g. r.
D - service is financed solely from service charges

Source: Tables 7 - 10 compiled from Lennox L. Moak, Refuse Collection and Disposal Service Charges, pp. 18-36.

TABLE 9

GROUP II MUNICIPAL GOVERNMENTS

PARTIAL LIST OF SERVICE CHARGES FOR REFUSE

COLLECTION SERVICES PERFORMED[a]

City, Province	Collection Service						Basis of Financing	Use of Private Contractors
	Domestic Garbage	Domestic Rubbish	Commer-cial Garbage	Commer-cial Rubbish	Indus-trial Wastes	Other Refuse		
Calgary, Alberta	nc	nc	c	c	c	ns	B	No
Edmonton, Alberta	pc	pc	c	c	c	nr	B	No
Victoria, B.C.	nc	nc	c	c	c	nr	B	nr
Burnaby Dist., B.C.	nc	nc	c	c	nr	nr	B	No
Winnipeg, Man.	nc	nc	nc	nc	ns	c	B	No
Prince Albert, Sask.	nc	nc	c	c	ns	nr	B	No
Melville, Sask.	nc	c	nc	nc	nc	nr	B	nr
Yorkton, Sask.	nc	nc	c	c	ns	ns	B	No
Moose Jaw, Sask.	nc	c	c	c	ns	nr	B	No

[a]See Table 7 for key and source.

TABLE 10

GROUP III MUNICIPAL GOVERNMENTS

NO SERVICE CHARGES FOR REFUSE COLLECTION

SERVICES RENDERED[a]

City, Province	Collection Service						Basis of Financing	Use of Private Contractors
	Domestic Garbage	Domestic Rubbish	Commercial Garbage	Commercial Rubbish	Industrial Wastes	Other Refuse		
Lethbridge, Alta.	nc	nr	nc	nr	nr	nr	A	Yes
Oak Bay Dist., B.C.	nc	nr	nr	nr	nr	nr	A	No
St. James, Man.	nc	nc	nc	nc	ns	nr	A	No
Moncton, N.B	nc	nc	nr	nr	nr	nr	A	Yes
Fredericton, N.B.	nc	ns	ns	ns	ns	ns	A	Yes
Halifax, N.S.	nc	nc	nc	nc	ns	nr	A	No
Mulgrave, N.S.	nc	nr	nr	nr	nr	nr	A	Yes
Toronto, Ont.	nc	nc	ns	ns	ns	nc	A	Yes
Ottawa, Ont.	nc	nc	nc	ns	ns	ns	A	Yes
Hamilton, Ont.	nc	nc	nc	nc	nc	nc	A	No
London, Ont.	nc	nc	nc	ns	ns	ns	A	No
Windsor, Ont.	nc	nc	nc	nc	nc	nr	A	No
Scarborough Twp., Ont.	nc	nc	nc	nc	nc	nr	A	No
Etobicoke Twp., Ont.	nc	nc	nc	nc	ns	nr	A	No
Port Arthur, Ont.	nc	nc	nc	nc	nr	nr	A	No
Thorold, Ont.	nc	nr	nc	nr	nr	nr	A	nr
Regina, Sask.	nc	nc	nc	nc	nc	nr	A	No
Saskatoon, Sask.	nc	nc	nc	nc	nr	nr	A	No

[a]See Table 7 for key and source.

TABLE 11

GROUP V MUNCIPAL GOVERNMENTS

NO DIRECT RESPONSIBILITY FOR

REFUSE COLLECTION[a]

City, Province	Notes
Central Saanich Dist., B.C.	No direct responsibility.
Colchester, N.S.	Private service which in larger villages amounts to $24 per year.
Bridgetown, N.S.	No municipal responsibility.
Queens County, N.S.	No county responsibility.
Toronto (Metro), Ont.	Refuse collection performed by constituent municipalities.

[a]See Table 7 for source.

TABLE 12

GROUP I LOCAL GOVERNMENTS

THE DECADE OF ADOPTION OF SERVICE CHARGES FOR REFUSE COLLECTION

IN 89 LOCAL GOVERNMENTS OF THE UNITED STATES AND CANADA

WHICH IMPOSE A SERVICE CHARGE FOR EACH TYPE

OF REFUSE COLLECTION PERFORMED

Population Group	Decade of Adoption of Refuse Collection Service Charge							
	Not Reported	1910-19	1920-29	1930-39	1940-49	1950-59	Year 1960	Total
Over 500,000	1	-	-	-	-	-	-	1
100,000-500,000	3	-	3	2	9	1	2	20
50,000-100,000	4	1	-	4	8	7	1	25
25,000- 50,000	2	-	2	-	2	6	1	13
Under 25,000	-	-	-	1	13	11	-	25
Counties and Special Districts	-	-	-	-	3	2	-	5
Totals	10	1	5	7	35	27	4	89

Source: Moak, Refuse Service Charges, p. 7.

TABLE 13

REVENUES AND EXPENDITURES FOR REFUSE COLLECTION

IN THE CITY OF EDMONTON 1937 - 1968

IN CURRENT DOLLARS

Year	Revenues	Expenditures	Year	Revenues	Expenditures
1937	16,730	81,956	1953	58,168	611,218
1938	17,329	87,166	1954	63,601	640,501
1939	18,990	95,244	1955	73,987	675,670
1940	18,726	101,303	1956	81,030	734,836
1941	18,423	109,354	1957	77,385	802,038
1942	18,040	113,999	1958	68,804	760,321
1943	18,730	125,902	1959	67,329	782,745
1944	18,282	138,574	1960	54,646	687,250
1945	19,107	155,974	1961	53,289	707,043
1946	19,802	193,496	1962	53,543	771,629
1947	21,515	255,562	1963	52,471	771,301
1948	25,754	269,106	1964	61,018	812,204
1949	38,681	333,706	1965	61,508	973,579
1950	54,704	361,366	1966	60,442	1,045,030
1951	54,723	452,774	1967	64,195	1,092,364
1952	58,714	518,724	1968	71,023	1,374,282

Source: The City of Edmonton, Financial Statements and Reports, 1937 - 1968; The City of Edmonton, Engineering Department, Summary of Revenue and Expenditure, 1950 - 1968, File No. A-25-2-12-8.

TABLE 14

EXPENDITURE FOR REFUSE COLLECTION AND TONNAGE HAULED

IN THE CITY OF EDMONTON

1962 TO 1968

Year	Expenditure	Tonnage Hauled	Cost per ton	Population	Cost per capita
1962	$ 771,629	88,170	$ 8.75	300,567	$2.57
1963	771,353	88,119	8.75	309,356	2.49
1964	812,204	91,982	8.83	316,704	2.56
1965	973,579	96,594	9.07	371,300	2.64
1966	1,045,030	103,212	9.06	381,230	2.74
1967	1,092,364	114,484	9.11	393,563	2.65
1968	1,374,282	128,854	10.67	410,105	3.35

Source: The City of Edmonton, Engineering Department, Sanitation Section, Annual Report, 1967, p. 3; 1968, p. 6.

TABLE 15

EXPENDITURES FOR THE DISPOSAL OF REFUSE

IN THE CITY OF EDMONTON 1950 - 1968

IN CURRENT DOLLARS

Year	Incinerator Expenditure	Dumps Expenditure
1950	35,573	30,882
1951	28,312	36,638
1952	28,232	53,394
1953	26,380	80,677
1954	41,231	81,809
1955	82,943	53,892
1956	106,239	59,928
1957	115,081	47,801
1958	137,508	16,336
1959	161,510	30,649
1960	179,741	97,995
1961	174,931	88,676
1962	190,589	62,067
1963	172,791	59,846
1964	167,668	60,407
1965	173,727	67,396
1966	171,684	78,341
1967	175,679	98,876
1968	199,009	117,381

Source: The City of Edmonton, Engineering Department, Summary of Revenue and Expenditure, 1950 - 1968, File No. A-25-2-12-8.

TABLE 16

POPULATION AND SERVICE CHARGE REVENUE IN NINE CITIES FINANCING THEIR REFUSE COLLECTION BY SERVICE CHARGES EXCLUSIVELY IN 1960

City, State	Pop.[a]	Rev.[b]	Revenue per capita (x_i)
Wichita Falls, Texas	104	572	5.50
Berkeley, California	111	532	4.79
Tacoma, Washington	148	815	5.51
Corpus Christi, Texas	167	699	4.19
St. Petersburg, Florida	180	1,289	7.16
Quebec City, Quebec	240	526	2.19
Wichita, Kansas	255	519	2.04
Oklahoma City, Okla.	324	2, 246	6.93
Fort Worth, Texas	356	1, 935	5.44

Source: Moak, Refuse Service Charges, pp. 18-22. Except per capita figures.

The standard deviation was computed using

$$\sigma = \sqrt{\frac{(x_i - \overline{X})^2}{n}} = 1.7087$$

where: x_i - revenue per capita

$\overline{X}$ - average revenue per capita (arithmetic mean)

n - number of cities.

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